CLAIMS

1. Injector-burner comprising a cylindrical body (3) defining a first longitudinal axis (6), the cylindrical body comprising
a first central duct (8) arranged along said axis,
at least one second, ring-shaped duct (10), arranged around said central duct (8),
a third ring-shaped duct (9), arranged around said second duct,
a head (2), fixed to one end of said body and provided with at least one first central hole (7), coaxial to the first longitudinal axis (6) and connecting said first central duct (8) with the outside of the cylindrical body (3),
the head (2) being provided with second and third through holes (5) connecting respectively said second and third ring-shaped ducts (9, 10, 11) with the outside of the injector-burner,
each second through holes (5) defining second respective axes,
each second respective axis forming a first angle with a plane passing through the first axis (6) and the intersection point of the respective axis with the external surface of the head (2) and furthermore each second respective axis defing a projection on said plane, forming a second angle with said first axis (6),
characterised in that the second and third holes are divided into several groups, the groups being reciprocally separated by circular sectors of the external surface of the head without holes, whereby the circular sectors have their apex on the first axis (6) and their angles are greater than the angular distance between two adjacent second holes.
2. Injector-burner according to claim 1, wherein each of the said third holes define third respective axis forming a first angle with a plane passing through said first axis (6) and the intersection point of the third respective axis with the external surface of the head (2) and having a projection on said plane forming a second angle with said first axis (6).
3. Injector-burner according to claim 2 wherein one or several of said groups of second and third holes (5) comprise holes whose axes have first angles with a value different from 0° and second angles with a value of 0°.

4. Injector-burner according to claim 3 wherein said several groups of second and third holes (5) are placed on the burner head symmetrically and directed in respective diverging directions with respect to its axis (6) so that said several groups of second and third holes (5) are suitable to produce respective flames in diverging directions and substantially symmetrical with respect to said axis (6).
5. The injector-burner according to claim 2, wherein said first and second angles of the respective axes of second and third holes have a value comprised between 5 and 60°.
6. The injector-burner according to claim 6, wherein second respective axes and third respective axes, crossover one another in pairs outside the injector-burner.
7. The injector-burner according to any of the previous claims, wherein the second and third holes are distributed on two circular crowns concentric with the axis (6) of the cylindrical body.
8. The injector-burner according to any of the previous claims, wherein said first duct, or the corresponding first hole, has a shaped converging or converging-diverging nozzle (15, 15').
9. The injector-burner according to claim 9 wherein the outflow of supersonic gas from the nozzle, with a variation in gas pressure along the length of the nozzle (15, 15') according to a hyperbolic tangent function.
10. The injector-burner according to any of the previous claims, wherein there is provided a fourth duct (16), inside the first duct, and substantially coaxial with it, for supplying solid or liquid components, dispersed in a gas.
11. The injector-burner according to any of the previous claims, wherein the second and/or third holes are shaped to a converging or converging-diverging nozzle.
12. A method for introducing one or more gases into a melting furnace for metals, wherein said gases are introduced in the metal through an injection burner according to any of the previous claims.
13. The method according to claim 12, comprising supplying an oxygen-containing gas to the first duct of said injector-burner, a fuel-containing gas to the second or third duct, so as to generate a flame outside the injector-burner.

14. The method according to claim 13 comprising ejecting gas containing oxygen from the first hole of said injector-burner at supersonic velocity.
15. The method according to claim 14 comprising part of said fuel reaching unburnt a metal melt inside the furnace.
16. The method according to claim 12 comprising supplying an oxygen-containing gas to the third duct of said injector-burner.
17. The method according to claim 14, comprising supplying a fuel-containing gas to the second duct of the injector-burner.
18. The method according to claim 12, comprising supplying a fuel-containing gas to the third duct and an oxygen-containing gas to a second duct .
19. The method according to claim 12 comprising supplying an oxygen-containing gas from the first duct of the injector-burner.
20. The method according to claim 19 comprising ejecting gas from the first hole of the injector-burner at supersonic velocity.
21. The method according to claim 20, comprising producing a coherent length of the gas jet from said first hole greater than the distance of the head of the injector-burner from the surface of a metal melt contained in the furnace.
22. The method according to claim 12 comprising introducing through the injector-burner's first duct a solid in the form of powder or granules.
23. The method according to claim 22, comprising introducing the solid together with a gas stream, whose outflow from the first hole of the injector-burner is subsonic.
24. The method according to claim 12, comprising introducing a solid in the form of powder or granules through the fourth duct of an injector- burner, according to claim 9.
25. The method according to claims 12 or 16, comprising supplying a fuel-containing gas to the first duct of said injector-burner in subsonic or supersonic regime.
26. The method according to claim 25 comprising part of said fuel reaching unburnt the surface of a metal melt inside the furnace.
27. The method according to any of the claims from 12 to 26, wherein said injector-burner is mounted on a lance fitted with a mechanical arm.